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## DEPARTMENTS.

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### SOLUTIONS OF PROBLEMS.

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#### ARITHMETIC.

98. Proposed by J. SCHEFFER, A. M., Hagerstown, Md.

A poor man borrowed \$20 which he repaid in eleven monthly installments of \$2 each; what was the annual rate of interest (reckoned as simple interest)?

Solution by G. B. M. ZERR, A. M., Ph. D., Professor of Natural Science, Chester High School, Chester, Pa.

Here we use the same formula we have used often before in the MONTHLY:

$$P = \frac{Pr(1+r)^n}{(1+r)^n - 1}.$$

Where  $p=2$ ,  $P=20$ ,  $n=11$ .

$$\therefore 2(1+r)^{11} - 2 = 20r(1+r)^{11}. \quad \therefore 2(1+r)^{11}(1-10r) = 2.$$

$$\therefore r = .016 \text{ nearly. } 12r = .192 = 19\frac{1}{5}\% \text{ nearly.}$$

$$\therefore 19\frac{1}{5}\% = \text{rate of interest.}$$

Also solved by ELMER SCHUYLER.

99. Proposed by B. F. FINKEL, A. M., M. Sc., Professor of Mathematics and Physics, Drury College, Springfield, Mo.

If 300 cats kill 300 rats in 300 minutes, how many cats will kill 100 rats in 100 minutes?

I. Solution by the PROPOSER.

1. If 300 cats kill 300 rats in 300 minutes,
2. 1 cat will kill 1 rat in 300 minutes,
3. 1 cat will kill 100 rats in 3000 minutes, and
4. 300 cats will kill 100 rats in 100 minutes.

II. Solution by CHARLES C. CROSS, Libertytown, Md.

If 300 cats catch 300 rats in 300 minutes, then 1 cat will catch 300 rats in 9000 minutes, or 1 cat will catch 100 rats in 3000 minutes.

Hence 300 cats will catch 100 rats in 100 minutes.

Also solved by G. B. M. ZERR, FREMONT CRANE, and ALOIS F. KAVORIK.

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#### ALGEBRA.

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86. Proposed by J. MARCUS BOORMAN, Consultative Mechanician, and Counsellor at Law, Woodmere, Long Island, N. Y.

Solve  $x^2 + yz = 16 \dots\dots (A)$ ;  $y^2 + xz = 17 \dots\dots (B)$ ;  $z^2 + xy = 22 \dots\dots (C)$ , for all the roots.

I. Solution by G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Science in Chester High School, Chester, Pa., and Prof. J. SCHEFFER, A. M., Hagerstown, Md.

Let  $y = vx$ ,  $z = wx$ .

$$\therefore x^2 + vwx^2 = 16, v^2x^2 + wx^2 = 17, w^2x^2 + vx^2 = 22 \dots\dots (1, 2, 3).$$